BRITISH COLUMBIA

OFFICE OF THE

POLICE COMPLAINT COMMISSIONER

TASER TECHNOLOGY REVIEW

&

INTERIM RECOMMENDATIONS

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INTRODUCTION

This Interim Report was produced at the direction of the Police Complaint Commissioner, in his Order for External Investigation dated August 5th, 2004.

The Order for External Investigation includes two separate, but related directives:

*"**NOW THEREFORE** it is ordered that Jamie Graham, Chief Constable of the Vancouver Police Department refer the investigation of this incident (the death of Robert Bagnell) under the Police Act to Chief Constable Paul Battershill of the Victoria Police Department to act as the Chief External Investigator."*

*"**IN ADDITION** to thoroughly investigating the aforementioned incident, Chief Constable Battershill is requested to review the present use of force protocol and make such interim recommendations as he deems appropriate for the use of the* TASER *by police officers in the Province of British Columbia pending the results of emerging studies presently underway.*

This Interim Report will deal only with the second directive, that relating to the use of the TASER by police in British Columbia. While the investigation into the death of Mr. Bagnell is ongoing, the investigative team believed there was an urgent need to disseminate our interim recommendations relating to police TASER training, reporting and terminology.

The past two decades have seen rapid advances in the field of "less than lethal" weapons. Bean bag rounds fired from a twelve-gauge shotgun, oleoresin capsicum sprays, rubber projectiles fired from Arwen guns and the TASER have all been developed in response to the demand for tools that will allow police to control non-compliant subjects with reduced risk to both the officer and the subject. The range of options available today far exceeds those available to officers even fifteen years ago, when a revolver and a wooden baton were the only choices for the patrol officer. None of the technology in use today, however, can completely eliminate the risk of physical harm to either the subject or the officer when police move to take a resistive subject into custody.

As this interim report was being prepared, the Canadian Association of Chief's of Police announced that the Canadian Police Research Centre would be engaging in a national study of the use of TASER. This team has met with Steven Palmer, the researcher heading that study, to exchange information. Our hope is that our final report will provide a foundation for future

research into a range of issues related to in-custody death, not restricted just to those associated with the TASER.

The Chief Coroner for the Province has also announced that his agency will be conducting a review of all restraint-related in-custody deaths in British Columbia. The four TASER-related deaths in this Province have not yet been examined via the Inquest process, but we anticipate this information may be available prior to the production of our final report. Preliminary information made available to us by the Office of the Chief Coroner was very helpful in focusing our ongoing investigation.

The contents of this Interim Report Include:

- A review of TASER Technology, focusing on the M26 and X26 Models
- A review of TASER Usage, placed in the context of the Canadian Use of Force Model
- A review of some of the relevant medical literature
- A review of restraint related death in British Columbia
- Interim Recommendations

NOTE: The use of the word "TASER" throughout this document refers exclusively to the product of TASER International.

METHODOLOGY

In the preparation of this interim report, the investigative team began with a comprehensive review of the medical literature and coroner's reports. There are a number of existing TASER studies, some sponsored by TASER International, some independent of the manufacturer, as well as major reviews conducted by the British Home Office and the U.S. Department of Defense. Neither of the latter two reviews has yet been publicly released, although the D.O.D. has announced a large purchase of TASER's made subsequent to their own study's conclusion.

Although very useful, a review of medical literature by this team clearly would not provide the requisite degree of expertise. Therefore, an early identified priority was the formation of a medical group that would provide a very wide range of expertise, encompassing such fields as psychiatry, neurology, pharmacology, cardiology, forensics, pathology and electro-physiology. Our goal was to create a comprehensive overview of the issues with a multi-disciplinary approach. Given the volume and the complexity of the material to be reviewed this medical team will not be reporting out prior to the release of this interim report.

Another identified priority was a comprehensive review of field usages, actual deployments of the TASER in operational settings. We have placed less emphasis on the large volume of voluntary exposures, many of which take place in a law enforcement training environment, feeling the relevance of those exposures was limited.

The investigative team also sought out new technologies which could shed more light on how the TASER actually affects human physiology, including breakthrough MRI studies conducted at the University of Toronto which can track the path of electrical currents throughout the body. Currently used to assess the effectiveness of cardiac defibrillators, this could also be used to provide a definitive answer to the question of whether or not electrical currents generated by the TASER are capable of reaching the heart. This is promising research which could provide new avenues for the Canadian Police Research Centre to pursue.

We also consulted with police use-of-force trainers, those individuals responsible for the training and development of control tactics in the Province. With the assistance of the Justice Institute of B.C. we were able to meet with trainers from across the Province, seeking their input on policy, training and tactics relevant to the TASER.

With the assistance of the Calgary Police Service and the Ontario Police College, we spent two days meeting with Mr. Chris Lawrence, a Team Leader at the O.P.C. who has spent the last five years in an exhaustive study of sudden death proximate to restraint and Excited Delirium. His generosity in sharing the results of his research is greatly appreciated. He is truly a pioneer in this field.

Understanding that paramedics play a vital role in this issue, we have consulted with our colleagues in the B.C. Ambulance Service and look forward to working with them further in the production of our final recommendations.

As a leading non-governmental organization concerned with this topic, we have also sought the input of the B.C. Civil Liberties Association, a group which has had a key role in the public dialogue around TASER safety issues.

TASER TECHNOLOGY OVERVIEW

TASER technology used by police agencies in British Columbia today include two models, both of which are produced by TASER International Incorporated. They are:

1. Advanced TASER M26
2. TASER X26

Both models are defined as conducted energy weapons. That is to say that they use propelled wires to conduct energy that affects the sensory and motor functions of the central nervous system.

Definitions

Central Nervous System:

- Includes the brain and spinal cord and is the command centre for processing information and making decisions.

Sensory Nervous System:

- Nerves that carry information from the body to the brain. These nerves sense temperature, touch, smell, etc.

Motor Nervous System:

- Nerves that carry commands form the brain to the muscles to control movement.

Stun Systems:

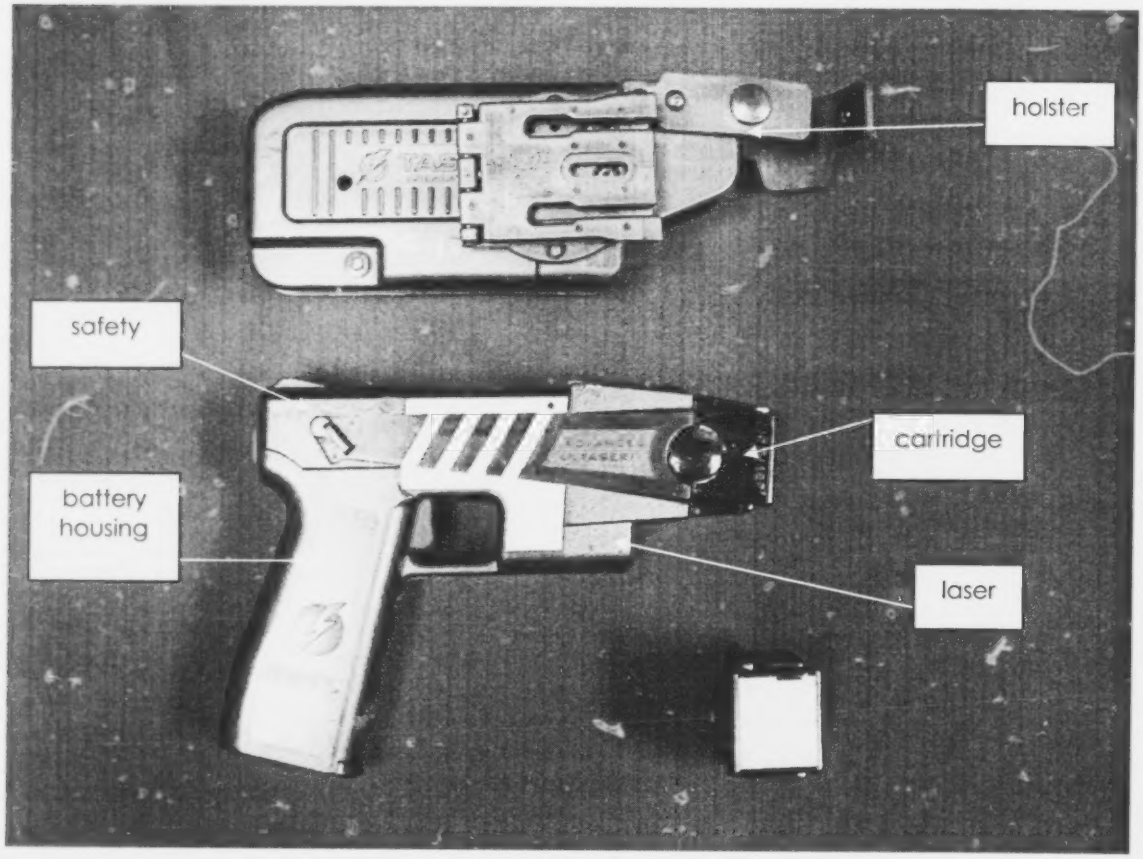
- Include small, hand held, commercially available stun guns (1st generation) that transmit electricity to a subject by the operator touching the subject with the metal probes that are attached to the front of the weapon. Also included is old TASER technology (Model 34,000) that propels probes at the intended target. This model is 2nd generation technology. Stun systems affect only the sensory nervous system in that they work on pain compliance.

Electro-Muscular Disruption (EMD) Systems:

- Include the Advanced TASER M26 (3rd generation), and the TASER X26 (4th generation). These conducted energy weapons stun and override the central nervous system, causing contractions of the body's muscle tissue. The M26 and X26 affect the sensory and the motor nervous system causing incapacitation of the subject.

Advanced TASER M26 Function

The M26 was introduced to Canadian policing in 1999 by the Victoria Police Department and has since been adopted by several other Canadian police agencies as an intermediate weapon. Its appearance is similar to that of a pistol and is able to be carried in a holster that is attached to an officer's duty belt. The photograph below show a M26 with cartridge attached to the front, the holster and a spare cartridge.



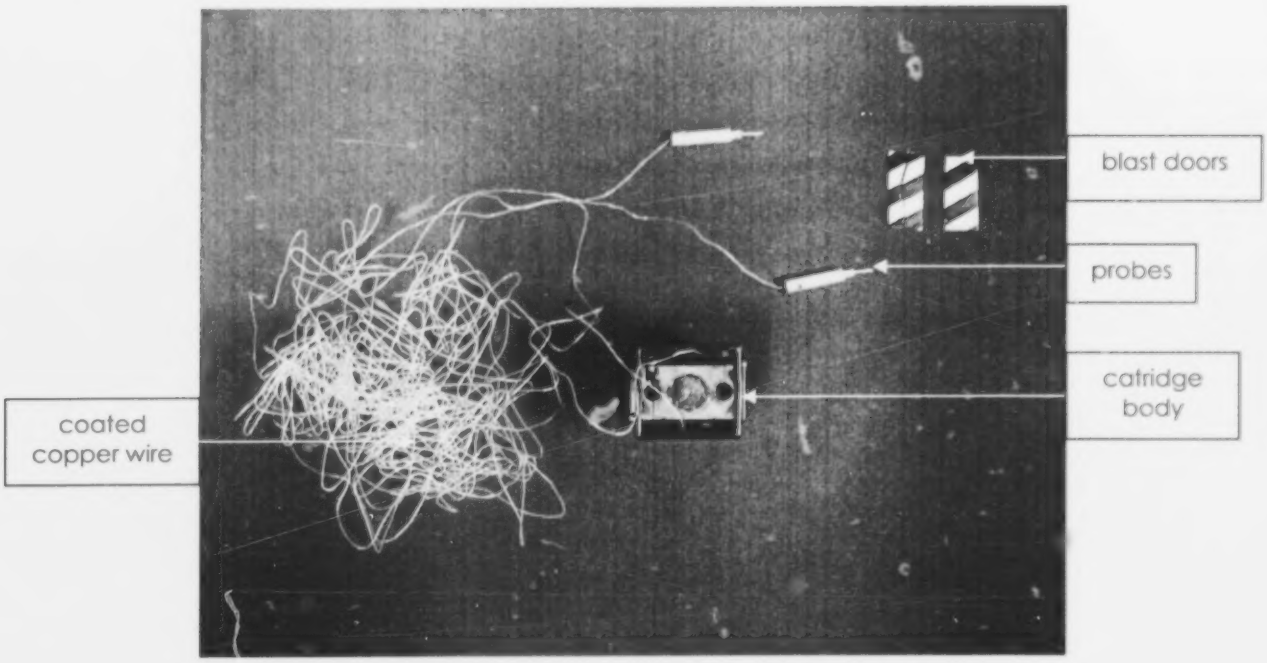
The M26 is powered by eight AA batteries and is equipped with an ambidextrous thumb safety that arms the weapon. A Class III A laser is mounted in the housing below the cartridge and activates when the weapon is armed.

The TASER can be used in two fashions; with or without a cartridge attached. If the weapon does not have a cartridge attached, it will function only as a stun gun. Basically it becomes a 1st generation stun system in that it works primarily on pain compliance affecting the sensory nervous system. It can, however, override the motor nervous system if the operator contacts a nerve ending as shown below (only a few are shown).

If the operator strikes a nerve ending, the TASER has the ability to override the motor nervous system causing incapacitation of the subject.

The second mode of function is for the operator to attach a cartridge to the weapon. Inside the cartridge are two probes that are attached to 21 feet of coated copper wire. When the operator pulls the trigger, the probes are propelled toward the intended target at 160+ feet per second by a nonflammable nitrogen capsule that is pressurized to 1,800 PSI. Please refer to the next page for a photograph of a discharged TASER cartridge.

Discharged TASER cartridge



Probe Trajectory

The operator aims the TASER in the same fashion as a pistol (centre of mass). When the probes are deployed from the cartridge they travel forward, the top probe in line with the laser sight, and the bottom probe at a downward angle of eight degrees. A rule of thumb for the spread of the probes is as follows:

- One foot of speared for every seven feet of distance between the officer and the subject.

Target Distance (ft)	2'	5'	7'	10'	15'	21'
Spread (in)	4"	9"	13"	18"	26"	36"

Recording Advanced TASER M26 Usage

The M26 has a data port at the rear of the weapon (see below) that allows for downloading of usage information to a computer. The weapon stores 585 cycles, that is each time the trigger is pulled and the weapon is fired. It records the time and date of the activation only.

Dataport

TASER X26 Functions

The TASER X26 was introduced in December, 2003 and is similar to the M26 in many ways. The most striking differences are:

- Size (the X26 is 60% smaller and lighter than the M26);
- Accessories (the X26 has LED lights and a laser sight, the M26 has only a laser sight);
- Power supply (M26 is powered by AA batteries, the X26 is powered by a lithium power cell);
- Data port (M26 records time/date of 585 cycles only, X26 records time/date/duration of cycle, temperature, battery status, and is searchable for 2,000 cycles); and
- Pulse (M26 uses 18 – 26 watts of power to incapacitate the subject, X26 uses 7-11 watts and has a more consistent flow of energy in its pulse because of the addition of a digital pulse controller).

The X26 is deployed in the same manner as the M26 and uses the same cartridge. It comes with a holster that is attached to the officer's duty belt and operates at the same voltage as the M26 (50,000 volts) but with lower wattage as compared above. The position of the ambidextrous safety, trigger and laser/LED lights are in the same location as the M26. A photograph of the TASER X26 is shown below.

TASER X26

Advanced TASER M26 vs. TASER X26

The photograph below illustrates the similar features of the M26 and X26 TASER's. It also shows the obvious size differences of the two models.

REVIEW OF FIELD USAGES

Because of the acknowledged limitations in the scientific research (specifically the ethical issues concerned with human research) it was our belief that a review of field usages of the TASER would provide valuable insight. We were able to access three separate sources of information in relation to this area. The first is the data collected by the Victoria Police between 1999 and July 2004, the second data collected by the Edmonton Police Service between 2001 and July 2004, and finally TASER International's field use database.

This data provides information on how the TASER is being used, the circumstances that cause police to choose that force option and the outcome when the TASER is utilized. We have included information on the Canadian Use of Force Model to provide further context to this data. The TASER is currently described as an Intermediate Weapon in this Model.

TASER International's field use database includes 4599 reports. Members of Canadian and United States police agencies, corrections personnel, United States military personnel deployed in Iraq and Australian police officers submitted these field use reports.

Each report has a cover page that is in a "check the box" format, designed to gather statistical data. TASER International's statistics on TASER use come from this data. The second page provides an opportunity for officers to provide a detailed narrative of the incident, although not all do so.

The cover page captures the following information about the subject:

- Sex;
- Age;
- Height and weight;
- Influences (PCP, cocaine , alcohol, methamphetamine, other drugs, mental or emotional illness);
- Incident type (civil disturbance, suicidal person, violent, officer assault, barricade, warrant, resisting arrest, other);
- Resistance level (verbal non-compliance, defensive resistance, active aggression, deadly assault);
- TASER deployment (darts (probes) fired, stun gun);
- If the deployment was successful;
- Number of shots fired;

- Distance;
- Number of darts (probes) that hit;
- Penetration;
- Duration;
- Officer injuries;
- Suspect injuries; and
- Other force (physical control, OC, baton, impact round, other force).

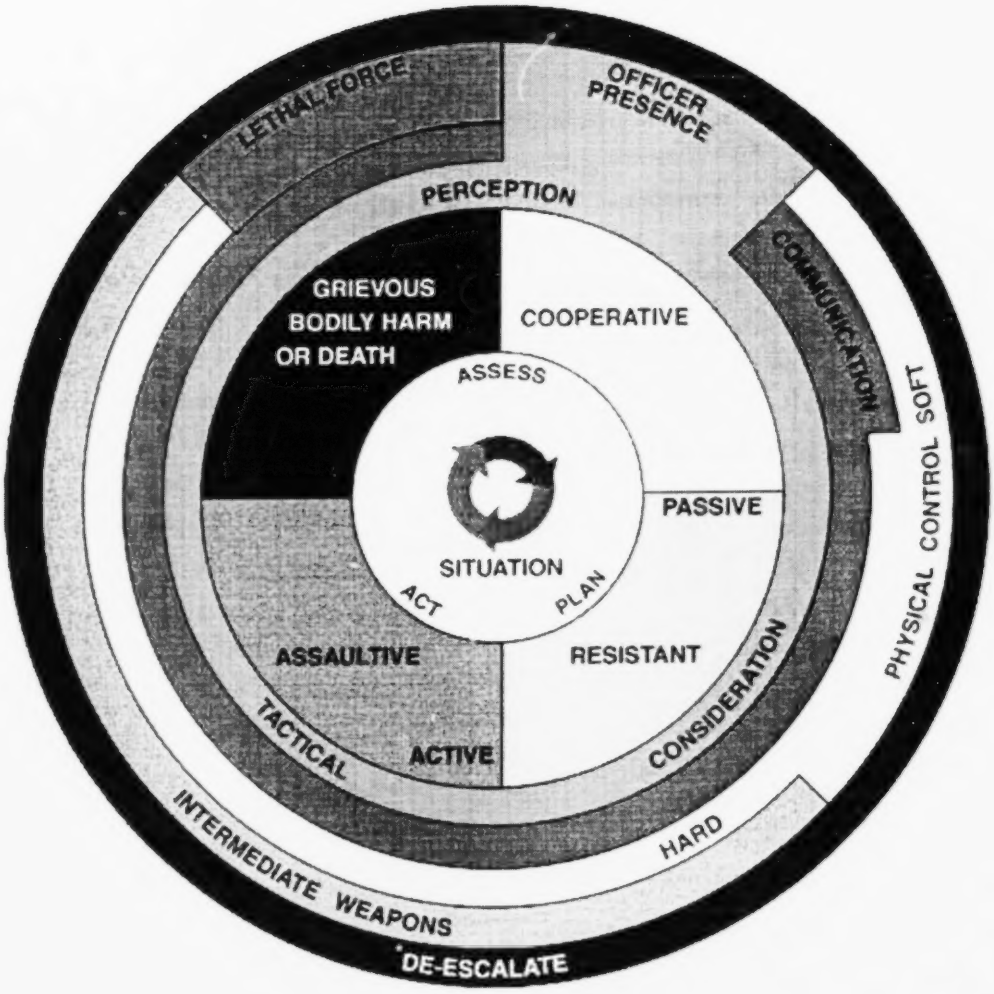
The second page of the report allows the submitting officer to describe the incident and offer comments. The final fields are for TASER International staff to offer an analysis, rate the effectiveness of the TASER and point out potential errors. The area that describes 'Resistance Level' relating to subject behaviour uses terminology common to American law enforcement.

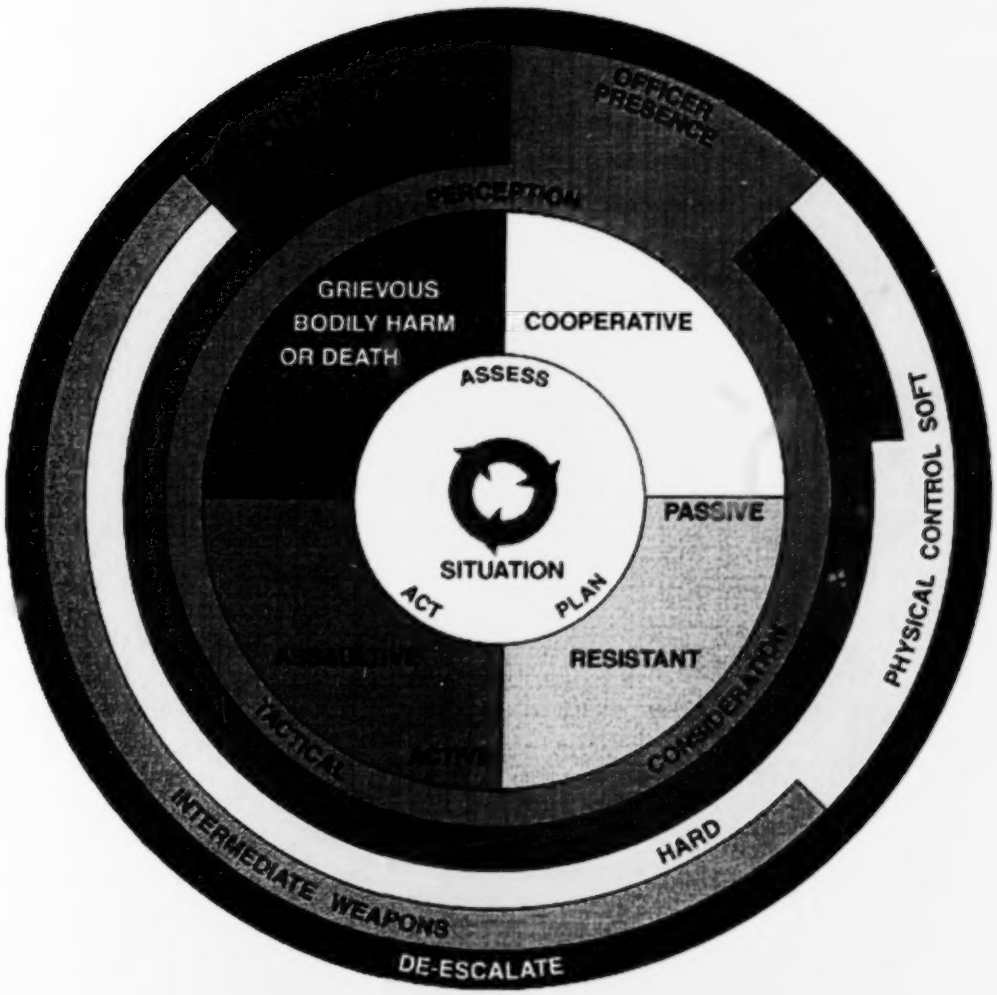
This reporting category refers to the following levels of resistant subject behaviour:

- verbal non-compliance;
- defensive resistance;
- active aggression; and
- deadly assault

To relate these statistics to our own terminology and to make them consistent with our own Use of Force model it was necessary to analyze and reclassify each event. The following is a brief review of the National Use of Force Model for Canada.

The National Use of Force Model that was modified in May 2000 guides police use of force in the Province of British Columbia. This model is circular in design and involves the following categories as illustrated on the following page:


LETHAL FORCE
OFFICER PRESENCE
PERCEPTION
COMMUNICATION
GRIEVOUS BODILY HARM OR DEATH
COOPERATIVE
ASSESS
PASSIVE
SITUATION
ACT
PLAN
ASSAULTIVE
RESISTANT
TACTICAL
ACTIVE
CONSIDERATION
PHYSICAL CONTROL SOFT
INTERMEDIATE WEAPONS
HARD
DE-ESCALATE


OFFICER PRESENCE
PERCEPTION
GRIEVOUS BODILY HARM OR DEATH
COOPERATIVE
ASSESS
PASSIVE
SITUATION
ACT
PLAN
RESISTANT
PHYSICAL CONTROL SOFT
HARD
INTERMEDIATE WEAPONS
DE-ESCALATE

SITUATION

With every situation, an officer must do three things, before, during and after the incident is concluded:

1. **Assess**: The officer must consider all elements of the situation. He/she needs to know the nature of the call, the suspect(s) involved, if he/she has backup available, what his/her physical abilities are, what the terrain at the location will be like, weather conditions and so on.

2. ***Plan***: The officer must formulate an action plan, bearing in mind that all situations are dynamic and constantly changing. Remember, every action has a reaction, so contingency plans must also be considered.

3. ***Act***: Once on scene, the officer must put his/her plan into action.

It is important to remember that often officers must assess, plan and act in a split second, as in the case of a spontaneous assault on the officer.

There are five categories of subject behavior. They range from complete cooperation to potentially lethal acts as follows:

1. ***Cooperative***: These types of subjects are referred to as "yes people" because often times seeing the police, a simple gesture or request to leave, will gain voluntary compliance.

2. ***Passive Resistance***: Subjects displaying this type of behavior do not do anything to actively hinder the police, but they are passively non-compliant. Protesters at a "sit-in" provide an example of this level of resistance.

3. ***Active Resistance***: Subjects who actively resist will typically pull their arms away from controlling officers, run away, hold onto fixed objects, brace themselves in doorways or "turtle" by pulling their arms into their chest area resisting attempts to straighten the arms.

4. ***Assaultive***: Assaultive subjects will strike or kick at officers. They may spit, swear or yell threats at officers and display various pre-assaultive cues that signal a possible physical assault on the officer.

5. ***Grievous Bodily Harm/Death***: Subjects in this category are attacking the officer with intent to injure or kill the officer, with or without weapons. This is the highest and most dangerous level of subject behavior and may result in the subject's death.

Officers have five response options available to them. It is important to remember that these are not levels of force, but each category of response options has levels of force ranging from implied to deadly force. They are as follows:

1. ***Officer Presence***: There are many elements of officer presence including the officer's appearance in uniform, his/her perceived level of fitness, size, sex, number of officers, available equipment, etc. Included in this category are perception (all officers see a given situation uniquely) and tactical considerations (any available options to confront the situation).

2. ***Communication***: This category includes verbal and non-verbal communication and once the communication commences, it should continue throughout the incident.

3. ***Physical Control***: Physical control is sub-divided into two categories; soft and hard. Soft physical control includes joint locks and manipulations, takedowns, neck restraints, etc. Hard physical control techniques include strikes, stuns and kicks. All techniques in this category are typically performed with empty hands and were formerly referred to as Empty Hand Control Tactics. These techniques range from implied to deadly force in context.

4. ***Intermediate Weapons***: These are the "gadgets" that are available to police officers and include; the TASER, OC Sprays and other chemical agents, batons, impact energy weapons (ARWEN, bean bag, etc.), police dogs, vehicles, weapons of opportunity, noise/flash diversionary devices, etc. As with other response options, levels of force in this category range from implied to deadly force.

5. ***Lethal Force***: Included in this category are all of the other options available in the preceding categories, as well as the various firearms available to the police.

With each report, subject behaviour as described in Resistance Level category and narrative was categorized according to Canada's use of force model. In many cases, the level of resistance checked on page one of the report was much lower than what was described on page two. Rarely was the level higher. When it was, this too, was recorded. Table 1 outlines the US resistance level and the corresponding Canadian subject behaviour level.

Table 1

UNITED STATES	CANADA
Cooperative	Cooperative
Verbal non-compliance	Passive Resistance
Defensive Resistance	Active Resistance
Active Aggression	Assaultive
Deadly Assault	Grievous Bodily Harm or Death

The data provided by TASER International was summarized based on the Canadian Use of Force Model and influencing factors for the following categories:

Table 2

TASER Field Use Stats - PROBES	TASER Field Use Stats - STUN
Female age unknown	Female age unknown
Male age unknown	Male age unknown
Male 18 and under	Male 18 and under
Male 19 – 25	Male 19 – 25
Male 26 – 30	Male 26 – 30
Male 31 – 35	Male 31 – 35
Male Over 35	Male Over 35
Female 18 and under	Female 18 and under
Female 19 – 25	Female 19 – 25
Female 26 – 30	Female 26 – 30
Female 31 – 35	Female 31 – 35
Female Over 35	Female Over 35

The key elements of the independent review were compared to the information provided by TASER International. A detailed breakdown of TASER uses followed by medical complications and death are also included in this report.

In addition, TASER data provided by the Edmonton Police Service and TASER usage totals for the Victoria Police Department are summarized but are not included in the analysis. The Edmonton information cannot be analyzed until the actual reports can be obtained to provide context for the data. The Victoria data will be analyzed and incorporated into the analysis of the data from TASER International in the next phase of this review.

RESULTS

Number of TASER Usages

TASER International provided the review team ten binders containing 4599 field use reports. A break down of the reports according to usages of the TASER is outlined in Table 3.

Table 3

TYPE OF TASER USE	TOTAL USES
Probes Fired at Subject	2438
Push Stun	893
Force Presence (Laser or Arc Display)	631
Failures (Probes Fired at Subject)	308
Failures (Push Stun)	42
Animals	60
TOTAL	**4372**

The remaining 227 reports were characterized as duplicate reports, missing reports, or insufficient information provided.

ANIMAL USES

The sixty field uses reported to TASER International involving animals are broken down as follows:

Table 4

TYPE OF ANIMAL	NUMBER OF INCIDENTS
Vicious dogs	52
Deer	3
Cattle	4
Raccoons	1
TOTAL	**60**

Of the sixty reported animal uses, only one TASER deployment is associated to the death of the animal. The circumstances of this exposure involve animal control personnel using a catchpole and a police officer using TASER technology. The TASER was used for two long cycles; the first being 23 seconds and the second 92 seconds. This incident reported that a vicious, goal oriented pit bull attacked officers and ultimately died after the TASER exposures and prolonged use of the catch pole around the animal's neck.

NUMBER OF MEDICAL COMPLICATIONS

Of the 4599 reports, 49 contained information indicating that the TASER use on a human resulted in medical complications. These reports have been categorized as follows:

Table 5

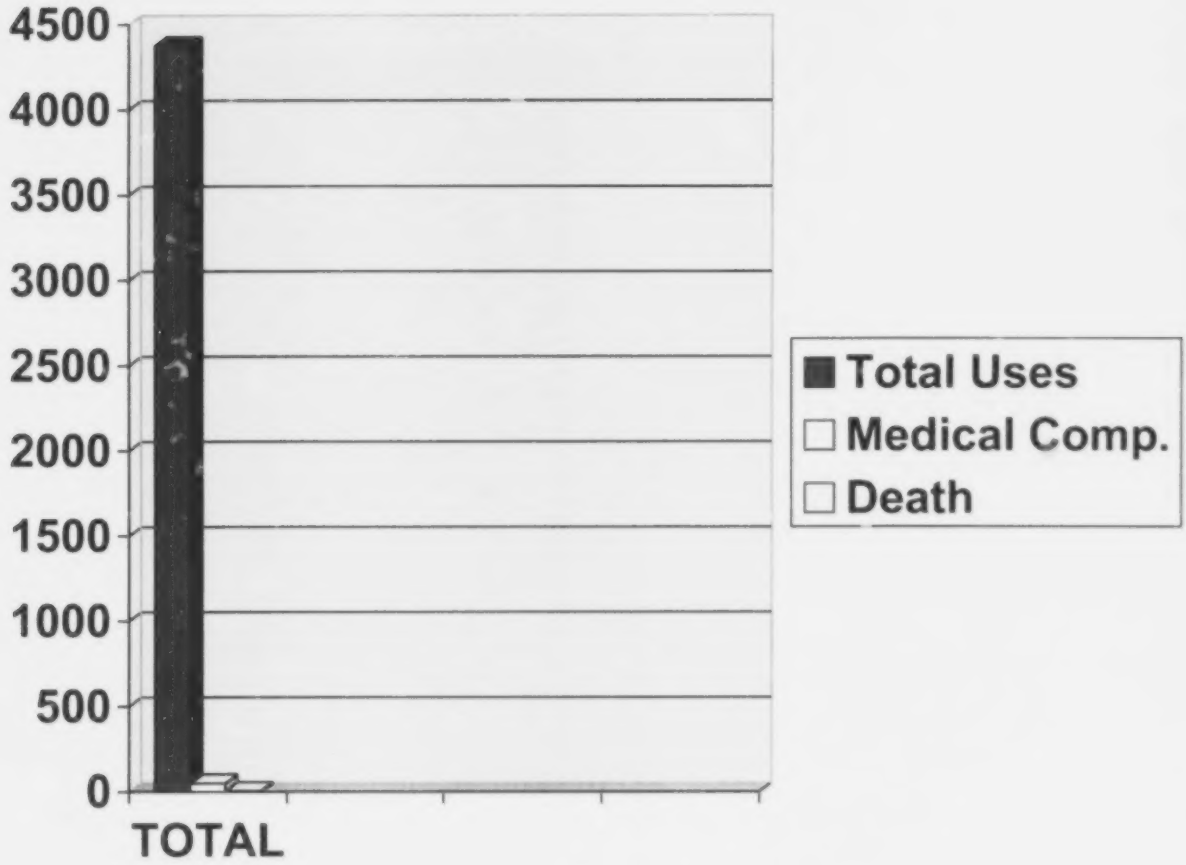
MEDICAL COMPLICATION	NUMBER OF INCIDENTS
Various (respiratory/circulatory)	23
Death with Firearms (police or suicide)	4
Death Other (respiratory/circulatory)	4
Pregnant Subject	2
Urination followed exposure(s)	9
Defecation followed exposure(s)	6
Urination & defecation followed exposure	1
TOTAL	**49**

Of the 4372 suitable field uses, only 1.12 percent ended with any form of medical complication, and only 0.09 percent were associated to an in-custody death. These results are illustrated in Table 6.

Neither of the two TASER uses on pregnant women reportedly involved medical complications to the fetus or mother.

Table 6

Number of Medical Complications and Deaths Proximal to Total TASER Uses



COMPARISON OF TASER DATA AND INDEPENDENT REVIEW OF FIELD USE REPORTS

Information Provided by TASER International

Field Use Database Statistics

The statistics provided by TASER International are accompanied by the following introductory statement:

"TASER International collects use of force reports through a web based reporting system at www.TASER.com. This reporting system is entirely voluntary. In fact, many of the largest police agencies have specific regulations prohibiting their officers from sharing use of force information with external agencies. Accordingly, we estimate that fewer than one in ten actual TASER device uses are reported. Hence, we estimate that an approximation of the true number of TASER device field uses is at least ten times the numbers reported herein." **(Note: The inclusion of this data with respect to projected usage rates does not constitute an endorsement of these figures by this Investigative Team)**

The following tables contain the information provided by TASER International.

Table 7

	DOCUMENTED REPORTS	ESTIMATED TOTAL
X26 Uses	744	7,440
M26 Uses	4,015	40,150
34000 Uses	28	280
Not Specified	140	1,400
Total # Reports	**4,927**	**49,270**

Overall Success Rate: **94.4%**

- M26 Success Rate: **94.2%**
- X26 Success Rate: **95.3%**

Table 8
Suspect Influences

INFLUENCE	INCIDENTS	EST. TOTAL	SUCCESS RATE
PCP	39	390	97.4%
Cocaine	234	2,340	92.3%
Alcohol	2,280	22,800	95.0%
Methamphetamines	215	2,150	96.3%
Misc. Drugs	261	2,610	93.5%
Emotionally Disturbed Persons	1,064	10,640	93.7%

Table 9
Types of Suspect Weapons Involved in TASER Incidents

WEAPON	INCIDENTS	EST. TOTAL	SUCCESS RATE
Blunt Weapon	113	1,130	2.3%
Firearm	173	1,730	3.5%
Edged Weapon	559	5,590	11.3%
Total	**4,927**	**49,270**	**100.0%**

Table 10
Sex of Subject

	INCIDENTS	EST. TOTAL	PERCENT
Female Human	445	4,450	9.0%
Male Human	4,423	44,230	89.8%
Animal	59	590	1.2%
Total Incidents	**4,927**	**49,270**	**100.0%**

Table 11
Age of Subject

AGE	INCIDENTS	EST. TOTAL	PERCENT
10 yrs & Under*	4	40	0.06%
11-20 yrs	686	6,860	14.77%
21-30 yrs	1,683	16,830	36.22%
31-40 yrs	1,313	13,130	28.26%
41-50 yrs	746	7,460	16.06%
51-60 yrs	174	1,740	3.75%
61-70 yrs	31	310	0.67%
71-80 yrs	7	70	0.15%
81-90 yrs	3	30	0.06%
Total	**4,646**	**46,460**	**100.00%**

* 3 of 4 uses on subjects age 10 or under involved children armed with edged weapons threatening to assault officers or other persons. The fourth case involved a 9 year-old girl who was violently thrashing, presenting a risk of self-injury.

Table 12
Types of Incidents Involving TASER Deployment

INCIDENT TYPE	INCIDENTS	EST. TOTAL	PERCENT
Officer Assault	3,941	39,410	80.0%
Warrant Service	320	3,200	6.5%
Barricaded	242	2,420	4.9%
Civil Disturbance	812	8,120	16.5%
Suicidal	759	7,590	15.4%
Resisting Arrest	1,698	16,980	34.5%
Violent	1,532	15,320	31.1%
Total Incidents	**4,927**	**49,270**	**100.0%**

Table 13
Level of Deployment

LEVEL	INCIDENTS	EST. TOTAL	PERCENT
Darts Fired at Subject	3,071	30,710	63.9%
Laser Only	567	5,670	11.8%
Spark Demo	122	1,220	2.5%
Dry Stun Application	1,043	10,430	21.7%
Total	**4,803**	**48,030**	**100%**

Table 14
Distance of Deployment

DISTANCE	INCIDENTS	EST. TOTAL	PERCENT
1-3 Feet	353	3,530	11.5%
3-7 Feet	1,223	12,230	39.9%
7-11 Feet	964	9,640	31.5%
11-15 Feet	415	4,150	13.5%
15-21 Feet	108	1,080	3.5%
Total	**3,063**	**30,630**	**100.0%**

Table 15
Success by Distance of Deployment

DISTANCE	SUCCESS RATE
1-3 Feet	94.2%
3-7 Feet	94.4%
7-11 Feet	93.1%
11-15 Feet	89.5%
15-21 Feet	89.5%

Table 16

Duration of TASER Discharge

DURATION	INCIDENTS EST.	TOTAL	PERCENT
1 sec	19	190	0.6%
1 sec	19	190	0.6%
2 sec	78	780	2.5%
3 sec	103	1,030	3.3%
4 sec	56	560	1.8%
5 sec	1,844	18,440	59.3%
More than one cycle	1,007	10,070	32.4%
Total	**3,107**	**31,070**	**100.0%**

Table 17
Number of Cartridges Fired at Subject

# CARTRIDGES FIRED	INCIDENTS	EST. TOTAL	PERCENT
1	2,705	27,050	86.0%
2 (from same TASER)	209	2,090	6.6%
2D (from different TASER)	176	1,760	5.6%
3	38	380	1.2%
4	17	170	0.5%
5	1	10	0.0%
Total	**3,146**	**31,460**	**100.0%**

Table 18
Number of Probes That Hit Suspect

PROBES	INCIDENTS	EST. TOTAL	PERCENT
1	199	1,990	7.9%
2	2,326	23,260	91.9%
3	6	60	0.2%
4	1	10	0.0%
Total	**2,532**	**25,320**	**100.0%**

Table 19
Suspect Injury Levels

INJURY LEVEL	INCIDENTS	EST. TOTAL	PERCENT
None	3,796	37,960	85.2%
Minor	561	5,610	12.6%
Moderate	72	720	1.6%
Severe	28	280	0.6%
Total	**4,457**	**44,570**	**100.0%**

Table 20
Officer Injury Levels

INJURY LEVEL	INCIDENTS	EST. TOTAL	PERCENT
None	4,359	43,590	94.3%
Minor	235	2350	5.1%
Moderate	25	250	0.5%
Severe	3	30	0.1%
Total	**4,623**	**46,230**	**100.0%**

CANADIAN USE OF FORCE CONTEXT FOR TASER USAGES

When the data from TASER International is analyzed with respect to the Canadian Use of Force Model, this analysis indicates that the TASER was in most instances used in the appropriate force context. Table 21 outlines these results.

Table 21

SUBJECT BEHAVIOUR	PROBE USES	STUN USES	TOTAL
Cooperative	0	0	0
Passive Resistance	42	18	60
Active Resistance	646	242	888
Assaultive	821	354	1175
Grievous Bodily Harm/Death	797	113	910
TOTAL	**2306**	**727**	**3033**

EDMONTON POLICE SERVICE

Below is a summary of data from Edmonton Police Service regarding that department's TASER usage. This data cannot be incorporated into the analysis of the data from TASER International because it is not accompanied by a narrative that allows a determination of use of force context in the same manner as the TASER International data was interpreted.

Edmonton Police Service (EPS)

The EPS has been using TASER technology since 2001. Their Officer Safety Unit was requested to provide any data they have compiled that is relevant to TASER use by their members. A summary of TASER use by year (2001 – July, 2004) follows.

TASER Deployments for 2001

In the year 2001, EPS members forwarded 40 Control Tactics Reports to Officer Safety Unit involving the use of TASER's.

Deployment Type:

Probes deployed:	22
Stun:	9
Laser/Presence:	9

Deployment Characterization:

Deployments to prevent an Assault on, or injury to a Police Officer	9
Deployments made during an Assault on a Police Officer	4
Deployments made to prevent Injury to Other Persons	14

Call Type: (Some subjects fall into multiple categories)

Suicidal Persons	8	Breach of Probation	2
Assaults	7	Mischief	2
Weapons Complaint	4	Forcible Confinement	1
Warrant Execution	2	Cause a Disturbance	1

TASER Deployments for 2002

In the year 2002 EPS members forwarded 164 Control Tactics Reports to Officer Safety Unit, involving the use of TASER's.

Deployment Type:

Probes deployed:	50
Stun:	71
Laser/Presence:	27
Unknown:	16

Deployment Characterization:

Deployments to prevent an Assault on, or injury to a Police Officer	42
Deployments made during an Assault on a Police Officer	21
Deployments made to prevent Injury to Other Persons	34

Call types: (Some subjects fall into multiple categories)

Suicidal Persons	14	Impaired/Suspended Driver	3
Assaults	11	Robbery	2
Assault of Police Officer	11	Domestic Violence	2
Trouble with Person	10	Miscellaneous	10
Mental Health Act	8	Intoxicated Persons	6
Resist Arrest	5	Mischief	5
Weapons Complaint	3	B & E	3

TASER Deployments for 2003

In the year 2003 EPS members forwarded 236 Control Tactics Reports to Officer Safety Unit, involving the use of TASER's.

Deployment Type:

Probes deployed:	74	
Stun:	83	
Laser/Presence:	20	
Unknown:	59	Not categorized due to incomplete report

Deployment Characterization:

Deployments to prevent an Assault on, or injury to a Police Officer	67
Deployments made during an Assault on a Police Officer	15
Deployments made to prevent Injury to Other Persons	78

Call Type: (Some subjects fall into multiple categories)

Weapons Complaint	18	Mental Health Act	10
Assaults	17	Domestic Violence	8
Trouble with Person	16	Impaired / Suspended Driver	7
Suicidal Persons	15	Pursuits/Traffic Stops	7
Miscellaneous	13	Robbery	5
Assault of Police Officer	11	Break & Enter	5
Intoxicated Persons	11	Warrant Arrests	5
Resist Arrest	3		

TASER Deployments for 2004

To the end of July 2004 EPS members forwarded 190 Control Tactics Reports to Officer Safety Unit, involving the use of TASER's.

Deployment Type:

Probes deployed:	57	
Stun:	88	
Laser/Presence:	27	
Unknown:	17	Not categorized due to incomplete report

Deployment Characterization:

Deployments to prevent an Assault on, or injury to a Police Officer	58
Deployments made during an Assault on a Police Officer	38
Deployments made to prevent Injury to Other Persons	25

Call Type: (Some subjects fall into multiple categories)

Trouble with Person	41	Pursuits/Traffic Stops	23
Assault of Police Officer	18	Assaults	18
Mental Health Act	16	Miscellaneous	15
Weapons Complaint	13	Intoxicated Persons	10
Suicidal Persons	8	Drug Complaints	8
Domestic Violence	7	Impaired / Suspended Driver	4
Theft	4	Break & Enter	4
Resist Arrest	3	Robbery	2

EPS TASER Effectiveness Rate

2001: Total of 40 Deployments:

32 – 100% effective

9 - Equipment failure or operator error

2002: Total of 164 Deployments:

159 – 100% effective

5 - Equipment failure or operator error

2003: Total of 236 Deployments:

227 – 100% effective

9 - Equipment failure or operator error

2004: To July 28 total of 190 deployments:

177 – 100% effective

13 - Equipment failure or operator error

The Edmonton Police Service is currently experiencing a 94% success rate in their use of TASER technology.

VICTORIA POLICE DEPARTMENT (VPD)

The Victoria Police Department has been using TASER technology since 1999.

YEAR	TOTAL REPORTED USES
1999	3
2000	22
2001	17
2002	33
2003	17
2004 (Jan to Jul)	18
TOTAL	**110**

A complete review of the Victoria Police Department field uses will be included in the final report. It is relevant to note, however, that no deaths have occurred proximal to TASER use by members of the Victoria Police Department.

An initial analysis of this Field Use Data would indicate that the TASER is an effective intermediate weapon with a very high (exceeding 90%) success rate. The TASER has superior success rate to oleoresin capsicum spray, which is particularly prone to fail on subjects who are either emotionally disturbed or under the influence of stimulant drugs. Also notable is the generally low rate of injury for both officers and subjects when the TASER is deployed, although there is a significant possibility of secondary injuries which must be included in the totality of circumstances when the TASER is employed.

A study conducted by the Phoenix Police found that after issuing TASER to their Patrol officers, the number of subjects injured during arrest declined by more than 60%. Phoenix also reported that as TASER use rose between 2002 (71 usages) and 2003 (164 usages) their officer-involved shootings declined from 15 between January and June of 2002 to 8 during the same period in 2003.

THE MEDICAL LITERATURE

There are a number of published medical studies and reports on the TASER, some of which have been sponsored by TASER International and others which were entirely independent of the manufacturer. Although our medical team will have the ultimate responsibility for reviewing and assessing the literature, we felt it was helpful to excerpt particularly relevant material we have located during this investigation. This document is by no means an exhaustive survey of all the available literature; rather it is an overview of some portions of the material we have examined.

The following studies we have classified as "independent", meaning that TASER International did not sponsor the research:

Stun Guns: The Medical Implications

Written by Joseph Heck of the Casualty Care Research Centre in Henderson, Nevada, in 2004, this article examines the medical implications from the perspective of emergency care providers. **(Tab I)**

> ***MEDICAL IMPLICATION:*** *The electrical impulse delivered by either the stun or EMD device is well below the level established as "safe" by the federal government and International European standards in approving such devices as electrified cattle fence, and the risk of cardiac complications is low. Sudden death has been reported proximate to electrical impulse device use, however in all reported cases the cause of death was attributed to other factors, primarily Drug intoxication, and there has been no direct link to the use of the device.*

Taser X26 Safety Analysis

This study was commissioned by Sgt. Scott Grenfell of the Victoria (Australia) Police in 2003. He tasked the Alfred Hospital in Melbourne with conducting an electrical safety analysis of both the Taser M26 and the newest model, the X26. **(Tab 2)**

> ***CONCLUSION:*** *The aim of this project, in accordance with the original meeting on 9 December, 2002 and subsequent e-mails, was to undertake electrical safety analyses of the Advanced* TASER *M26 and the X26 EMD devices and are not product endorsements. Specifically, this analysis was to compare the X26 against the earlier M26 model. We did*

not conduct tests on, or check the accuracy of, the firing mechanism. The project was restricted to:

(a) a literature review;

(b) practical test of TASER output into known test resistances. This is a device test only, the firing mechanism and probes were not checked;

(c) verification that the X26 complies with Australian medical device standards;

(d) comparison of actual measured TASER output to calculated outputs of common high electrical output medical devices and domestic equipment; and

(e) medical recommendations concerning post-use checks on a person after being Tasered. This was attached to the M26 report and the same conditions apply to the X26 TASER.

A thorough investigation of available information regarding the X26 TASER use was undertaken. This included correspondence with members of the Victoria Police and searches of websites that are considered conservative with respect to technology changes.

This new model has advantages of significantly reduced size, weigh and power while retaining the non-lethal incapacitation properties of the previous model. Our testing showed it to be superior to the M26 in terms of performance and ease of use. The shaped pulse discharge waveform in the X26 TASER is designed to maximize the disabling effect on humans and therefore may not be as effective on animals. The manufacturer's trials showed the X26 to be 5% more effective on human subjects than the M26 model with less subject disorientation during the "stun" phase. The design of the X26 is a "constant current" design compared to the "constant voltage" of the M26. This makes the X26's performance on human subjects more predictable, while conserving battery consumption. Usage data can be downloaded via a USB dataport.

The measured X26 results were compared with recognized Australian/New Zealand and the International Electro-technical Commission (IEC) electrical safety standards for the application of electric current to the human body. Both M26 and X26 TASER outputs were then compared with some typical medical and domestic equipment. ***As shown in the table (section 3.5), the M26 TASER output is less than 2% of the normalized current likely to produce ventricular fibrillation. The X26 improves this figure even more to less than 1% of normalized current likely to cause ventricular fibrillation.*** **(Emphasis added)**

As part of the bio-medical engineering study conducted by the Alfred, their team consulted with Dr. Broughton, a cardiologist affiliated to the same hospital. His response included the following: **(Tab 3)**

> *Occasional deaths have been reported in offenders shot with the TASER, but none have died "instantaneously". This fact and extensive trials in normal volunteers give support to the manufacturer's contention that the TASER will not induce dangerous cardiac arrhythmias such as ventricular fibrillation in human subjects.*
>
> *Overseas, subjects are routinely admitted to the local hospital ED for 4-6 hrs observation after being 'TASERED'. The purpose of this period under medical observation is to minimize harm to the offender who is otherwise exposed to a variety of potential dangers. These may include some or all of the following:*
>
> 1. *Pre-TASER risks to offender's health/life*
>
> *Drug-induced toxic states-alcohol, cocaine, PCP, amphetamines*
>
> *Has caused most previous deaths after Tasering*
>
> *Acute psychiatric decompensation*
>
> *Pre-existing injury (from violent behaviour pre-Tasering)*
>
> *E.g. Fractures, head injury*
>
> 2. *Post-TASER Risks to offender's health/life*
>
> *Trauma from TASER induced falls*
>
> *E.g. Fractures, head injury*
>
> *Barb injury-*
>
> *Potential for damage to eyes, major vessels (rare/not Reported)*
>
> *ED staff need training in barb removal*
>
> *Electrical current injury*
>
> *Potential for reprogramming permanent pacemaker Devices*
>
> **CONCLUSION:** *The advanced TASER appears from the manufacturer's data file to be a relatively safe device for immobilizing non-violent offenders. However, these subjects are exposed to a number of immediate risks/potentially fatal dangers operating either just before or just after being apprehended with the aid of the TASER. It would be prudent*

to routinely observe all "TASERED" offenders in for 4-6 hours in a suitably equipped hospital emergency department.

This letter highlights a useful distinction between what may be termed "primary injuries", those caused directly by the use of the TASER, such as injuries from the barbs entering the skin and "secondary injuries"; those that occur as a result of the subject losing muscular control and falling. An interesting perspective on these secondary injuries was also provided by a 2004 study from Oregon.

A Prospective Case Series Describing the Injury Pattern of the Advanced M26 TASER in Multnomah County, Oregon (Tab 4)

This was a prospective study conducted after the adoption of the TASER by the Portland Bureau of Police. It reviewed 227 TASER usages and the corresponding emergency medical services care reports for the period between June 2002 and July 2003.

> ***RESULTS:*** *Of the 227 successful* TASER *deployment, 96 (42%) of the incidents had EMS reports. Median patient age was 36 years; 92% were male and 64% were white. 31 (32%) patients received a "Dry stun" when 65 (68%) were shot with the* TASER. *There were no documented deaths, dysrhythmias, or cardiac complaints. 60 (63%) of the patients had no documented injury, while 27 (28%) sustained minor secondary injuries (hematomas, lacerations and contusions) and 9 (9%) sustained self-inflicted or unrelated injuries.*
>
> ***CONCLUSION:*** *The M26 appears to be a safe and effective non lethal weapon in this case series. No deaths were reported. However, a higher incidence of minor injury was noted more than previous manufacturer reports. A prospective trial of its use to better define a risk-benefit relationship is justified.*

TASER Report-A Medical/Safety Review of the TASER

The Kalamazoo County Sheriff's Dept. commissioned Dr. Charles Butler to assess the scientific and medical data evaluating the safety and efficacy of the TASER. In his 2004 report **(Tab 5)** Butler stated the following:

> ***SAFETY: under*** *the usual conductivity assumptions, subjects exposed to the M26* TASER *will receive 1.76 joules/sec or 26 watts. How safe is this?*

Electrical injuries fall in three categories:

- *Direct-thermal injuries resulting from the current itself;*
- *Heart-cardiac arrhythmias, ventricular fibrillation, cardiac standstill; and*
- *Blunt Trauma-resulting from muscle contractions and falls secondary to the application of electric current*

Direct thermal injuries from the M26 with this amount of current should consist of nothing more than local burns at the insertion site of the barbs. Cardiac events are trickier to predict. Most studies done to determine cardiac vulnerability involve using alternating currents at 60 hertz (United States) and 50 hertz (rest of the world). Using these parameters it has been found that:

- *25mamps-75 mamps stop the heart;*
- *75-4 amps cause ventricular fibrillation;*
- *more than 4 amps cause cardiac standstill*

The M26 Advanced TASER runs at a calculated 45-50,000 hertz. There is little experimental data at these high frequencies. Theoretically, physiologists have calculated that ventricular fibrillation current would need to be 14 times greater at 1000 hertz than 50 hertz. At 45,000 hertz, the current necessary to cause ventricular fibrillation is calculated to be 70,000 mamps (70 amps) or more than three times the peak 18 amp current generated by the M26. Note that these values are calculated - not measured! Sometimes when things are actually measured, they are quite different (higher/lower) than predicted. The point is, we are dealing with calculations, not empirical knowledge.

Calculations and testing are generally done with respect to normal hearts. Many cardiologists and cardiac surgeons believe that patients with abnormal hearts such as those who had a previous heart attack, those with certain arrhythmias, those with "irritable foci" are much more prone to lethal arrhythmias than normal people. Laboratory testing sponsored by TASER International leads to the conclusion that the TASER is safe for use on those with pacemakers. Geddes "the father of the modern pacemaker" states in the medical Journal Lancet (2001 358:687-688):

"Further research on what cardiac effect TASER ...would have on people with Pacemakers is needed."

Blunt Trauma resulting from falls after TASER exposure may have been underemphasized in many safety reviews. Reported blunt traumatic injuries are becoming more frequent as the TASER itself is used more frequently. Two case reports have been published with respect to police officers training with the TASER. The two officers fell after being shot in the back with the electrical barbs. Both suffered serious head injuries requiring hospitalization. One officer was hospitalized for almost a week and will be out of work indefinitely. In another report the Las Vegas Police Department trained 500 officers to use the TASER. Eight of these officers were injured seriously enough that they had to miss work. The lay press has been and will be quick to report numbers of subjects hospitalized with head and other injuries after being exposed to the TASER.

Other Morbidity: there is certainly other morbidity associated with being on the receiving end of a fired TASER. Aside from the universal occurrence of pain, electrical stimulation, and a fall to the ground, a poorly aimed dart could destroy an eye. The effect of the TASER on a fetus in a pregnant female is unknown. This report includes a documented medical case of a miscarriage after a TASER strike (Causal relationship?) It also contains a study indicating that the TASER has no effect on the fetus in-utero. The uterus and amniotic fluid conduct electricity. One reviewer concludes that TASER current passing through the uterus and amniotic fluid to the fetus caused the miscarriage. Another reviewer postulated that the very conductivity of the uterus and amniotic fluid constitutes a Faraday shield. He postulates that the later occurring miscarriage was incidental and unrelated.

Mortality: A number of subjects have died in custody shortly after being shot with the TASER. The point at issue is whether the relationship is temporal or causal. If the answer to this question may never be known with absolute certainty, then the <u>incidence</u> of death after TASER deployment becomes extremely important.

The calculation of death rate after TASER deployment also proves somewhat ephemeral. In medicine, surgical mortality is calculated as death from all causes that occurs within 30 days of an operation. If we modify this to the TASER we will define the "TASER death rate" as death from all causes within 24 hours of patient exposure. This definition <u>does not imply causality.</u> Using numbers released by TASER International we have 46 deaths in 70,000 TASER exposures (in 40,000) subjects or death occurs every 1522 times the TASER is fired or one in every 870 people shot by the TASER died within 24 hours. The Lancet, a well-respected medical Journal, published a review of 218 consecutive subjects who

were "TASERED". This article published in 2001 reports 3 deaths. This would lead to the conclusion that death occurred once for every 73 subjects struck by the TASER. The true incidence probably lies somewhere between the two figures.

Butler concludes his review with the following points:

- *Up to the present there is no proven connection between the use of the TASER and the occurrence of in-custody deaths*
- *There is no evidence of long-term harm from electric current in survivors of the TASER*
- *The electrophysiological literature indicates that the M26 Taser does not exceed published electrical current limits*
-
- *Use of the Taser Reduces Injuries Compared To All Alternative Methods Studied*

Taser International has sponsored several medical reviews related to product safety. In 2003 Dr. Bleetman and Dr. Steyn of the Birmingham Hospital conducted a TASER - funded study focusing on the injury potential of the weapon. **(Tab 6)**

Their study concluded the following:

- *The medical risks of electronic weaponry compare favourably with those of more conventional methods of controlling non-compliant and violent subjects. It has been impossible to accurately calculate how much electrical energy the Advanced TASER delivers into the human body;*
- *There exists no convincing evidence directly implicating TASER weaponry in deaths of subjects in over 25 years' experience in America;*
- *Risk factors for death in "TASERED" subjects appear to be no different from known risk factors for death in custody (drugs, exhaustion, bizarre behaviour leading to arrest etc.);*
- *The risk of harm might well be higher for using these devices on patients with pre-existing heart and neurological diseases. These risks are largely theoretical and have not been demonstrated in field application or laboratory testing to date;*
- *The risk to patients with implanted pacemakers and defibrillators are probably quite small;*
- *The potential for significant injury exists for TASER barbs striking the eye, open mouth, neck, genital, and large blood vessels in the groin;*
- *The TASER delivers electricity that incapacitates the subject and ends the physical, (and likely the psychological), resistance to arrest. It causes a degree of stunning. Much useful data has been gained from over 800 volunteers. More work is required to record the effects of the Taser on physiological variables and ECG tracings; and*

- *The TASER is most unlikely to cause any permanent physical problems in healthy individuals.*

TASER International has also conducted a number of animal studies under the auspices of their Medical Advisor, Dr. Richard Stratbucker. **(Tab 7)**

In 1996 Dr. Stratbucker conducted experiments to test the safety of the Air TASER, a predecessor to the M26. Part of the research involved applying electrical currents several times more powerful than those generated by the Air TASER to an anaesthetized pig while the animal's heart function was monitored. Stratbucker reported the following results:

> *"Of the more than 48 discharges of five seconds duration, there was no case in which the animal revealed any cardiac ectopy or myocardial injury.* ***The cardiac tissue proved resistant to stimulation despite progressively increased skeletal muscle effects noted as the storage capacitors and battery output were increased by several hundred percent.***"

A more recent study conducted by Dr. Stratbucker utilized both the Air TASER and the Advanced TASER in a study designed to determine whether the devices could induce ventricular fibrillation when they were applied to the chest areas of anaesthetized dogs. The protocol involved the administration of 236 shock discharges via probes placed on the thorax area. No episodes of ventricular fibrillation were noted during these tests.

Dr. Stratbucker concluded from these tests that the risk of inducing ventricular fibrillation by normal use of the TASER in healthy humans is "very small."

One of the most interesting documents we located during our research was the transcript of a public presentation done as part of the work of a TASER Task Force created by the Orange County Sheriff's Office in Florida. **(Tab 8)** This Task Force assembled a panel of four medical professionals to review the literature and provide opinions in a public forum. The forum was held July 28, 2004, in response to several highly publicized incidents of death associated to TASER use by police. Our belief in the value of creating and using a multi-disciplinary medical team was strengthened by our exposure to this Task Force.

We have quoted some relevant sections of their presentation. This was the single most accessible document we located that canvassed the issues in a fashion readily understandable to a layperson.

First to speak was Dr. Aurelio Duran of the Orlando Heart Center, a cardiac electro physiologist:

> *"In the real world, the individuals that I read who have problems tend to be people who have problems minutes or hours after being tasered. If a device was able to cause a bad heart rhythm - if I by mistake was fixing one of these outlets here and got electrocuted and it caused a bad rhythm - you would see me immediately collapse and I wouldn't get up and start walking around and talking to you. I would collapse and wouldn't come back to life unless a paramedic came and shocked me out of death."*

He was followed by Dr. Daniel Brennan, an Emergency Room Physician at the Orlando Regional Medical Center:

> *"It's very hard to shock people's hearts. We use defibrillators with big paddles and high energy because of that resistance of air....So the TASER, in contrast, even though it is high voltage, it has very low current, very low amperage, and a very short duration as well. It does use repetitive cycles, 5-30 cycles per second. That's how we're actually able to immobilize the person we're trying to immobilize with the TASER, I suppose, because it's not just one quick jolt where your body would give just a jerk, but it's several cycles, over several seconds, to immobilize the person. The energy used is about 1.6J, where as the exo-defibrillator we use in the EMS and the emergency fire unit are a minimum of 50-360J. So again, it's a very minimal amount of energy."*

Dr. Bob Vandervoort, a pharmacologist, was then called on to discuss the role of cocaine and the relationship between consumption and psychosis:

> *In a study of 55 patients admitted into a hospital for cocaine help, these are people who actually sought treatment, 53 percent, this is over half the people who were regular cocaine users, had features of psychosis. It's not like five, ten percent of people. We used to think, back in the 70's, that the number was eighteen percent. But that was when it was the entry nasal form that everybody was using. When I looked up the different forms of ingestion, entry nasal form only had four percent incidence of psychosis. In that same study, the crack users had 52 percent, very similar to this number. Of those people who had psychosis, ninety percent had delusions, 96 percent hallucinated, and look at the last one; 48 percent of people, half the people who had psychotic effects, said they had it every time they used the drug.*

The final speaker was the Chief Medical Examiner for Orlando, Florida, Dr. Jan Garavaglia. Dr. Garavaglia provided a summary of information relating to in-custody death:

> *"When I first got here, I had a TASER death right away. The first thing I asked was what he did after he got shot with the TASER. And they said he did this and this and this. Well, I know that the TASER didn't kill him. You're not going to have a delayed effect with the electricity. So the common factor in the deaths reported seems to be the excited state of the individual being shot by the TASER. The timeline of Excited Delirium deaths - that's what we call the deaths of people very excited-was first reported out of Miami in 1985. It was reported by a doctor there, who had seven cases, all showing bizarre psychotic behaviour. They all had hyperthermia, meaning elevated body temperature, and we're talking up to 107-108. They were all very hyperactive and had experienced extreme exertion while fleeing or being pursued by the police. And then they had sudden deaths, sudden death usually after being restrained by the police. 1985 is probably a very important date, because that's the date when crack cocaine started being actively marketed in Miami.*
>
> *Excited Delirium Syndrome is found to be different than acute cocaine intoxication deaths. We see cocaine intoxication deaths a lot, because the mechanisms are usually heart weakness, seizures, and that can happen with your first time use. You can die from cocaine with your first time use and I've had some well documented cases of that. This is a totally different syndrome. With Excited Delirium deaths, usually the cocaine is present in low levels. Sometimes you find them with the metabolite present. They always have a history of chronic cocaine use. They tend to be crack users. They are also IV cocaine users; you hardly ever see it with the nasal. They have very bizarre, excited behaviour, they have hyperthermia, and they tend to have a much lower instance of seizures than in acute cocaine death."*

Dr. Garavaglia concluded his presentation with this statement:

> *"It is my belief that TASER use is now associated with Excited Delirium, because its associated; that's how they're bringing them down, but there's really no evidence that they're causing any of the deaths. Actually, according to the National Association of Medical Examiners, the physician paper, this cocaine Excited Delirium is now a fatal disease, whether the police interact or not. These are people with elevated temperatures 107-108 and its chronic cocaine use; you don't ever see it with a first episode*

use. Thus I believe these individuals would have died with or without being shot with a TASER."

The most recent statement on the medical implications of the use of the TASER was released to us on Sept. 22nd, 2004 and came from the Defense Scientific Advisory Council of the U.K. **(Tab 9)** The DSAC had created a sub-committee to advise the Secretary of State for the Home Department with medical advice on various less-lethal weapons systems.

The sub-committee was tasked with examining the M26 TASER and had recommended further research with respect to the cardiac hazards associated with TASER use in individuals at greater risk, i.e. those using drugs of abuse, those with acidosis and other pre-existing diseases and those with pacemakers and other implanted devices.

Effects of drugs of abuse on cardiac function: *Seven recreational drugs or their active metabolites were examined in the sheep isolated cardiac Purkinje fibre preparations. MDMA (Ecstasy) and phencyclidine (PCP) produced effects on the action potential suggestive of an increased risk of development of torsades de pointes arrhythmia. Although cocaine, cocaethylene (a psychoactive metabolite formed when cocaine and alcohol are concurrently abused) and (+) methamphetamine did not induce action potential prolongation, a critical review of the scientific and clinical literature revealed that these drugs still have the potential to compromise cardiovascular function in a way that could precipitate a life-threatening cardiac event. The clinical literature suggested that morphine (the principal metabolite of heroin) and 9-tetrahydrocannabinol (the principal psychoactive component of cannabis) are likely to be relatively benign in terms of cardiovascular toxicity at doses likely to be employed by abusers.*

The results from the study, together with evidence gleaned from the literature, suggest that some frequently abused drugs have the potential to contribute to any cardiac-related morbidity or mortality that may arise in the context of TASER *use. Furthermore, it seems reasonable to assume that this conclusion could be generalized to other emotionally charged and possibly violent confrontations with law enforcement personnel.*

The adverse cardiac effects produced by any individual drug are likely to be dependent on several risk factors, including dose consumed, co-use with other drugs (including pharmaceutical drugs and ethanol) and pre-existing heart disease. This complex

interplay of multiple risk factors could conceivably contribute to any cardiac-related morbidity or mortality associated with TASER *use against drug-intoxicated persons. Officers should be aware that the risk of any adverse response in the aftermath of* TASER *deployment may be higher in drug-impaired individual, and accordingly, they should be vigilant of any unusual behaviour displayed by the apprehended person that may signal the need for early medical intervention.*

On the issue of electrical pulses applied to isolated beating hearts, the sub-committee reported that the complex mathematical modeling necessary to do this had encountered several setbacks and that these had been recently overcome. As a result, studies on the isolated beating heart will now commence.

On the vulnerability of pacemakers and other implanted devices the sub-committee reported that the probability of direct impact and physical damage to implanted electronic devices was very low and the effects of the M26 electrical fields on the function of pacemakers was unlikely to be permanent. They also concluded that the age profile of pacemaker recipients made them far less likely to be involved in a situation where a TASER would be deployed.

The overall conclusion of the sub-committee: *The risk of life-threatening or serious injuries from the M26 TASER is very low.*

EXCITED DELIRIUM AND RESTRAINT ASSOCIATED DEATHS IN BRITISH COLUMBIA

During the review of the medical literature we noted numerous references to risk factors associated to death proximate to restraint, whether or not the TASER was a mechanism in that restraint. We undertook further research to determine what role, if any, these risk factors could play in deaths associated to TASER usage.

The Coroners Service provided a summary of restraint-associated deaths in British Columbia between 1990 - 2003. There were 22 of these that were investigated by the Coroners Service. Nineteen of these cases involved police; the other three were unrelated to any police or other emergency service action.

Of these 19 cases, 13 of the deceased individuals were found to have cocaine present in their systems, one had been bingeing on alcohol for three days prior to his death, one was in a state of acute psychosis and one individual tested positive for pseudo-ephedrine.

The fact patterns have a disturbing familiarity. In almost every case, police are called because a subject is behaving in a bizarre fashion and is unresponsive to verbal direction. As police move to take custody of the individual a violent struggle ensues and police use some form of restraint to try and maintain control. In some cases the subjects were handcuffed, in 3 cases they were "hog-tied" and in others, restraints on an ambulance gurney were applied. The individuals struggled against the restraints and then lapsed into tranquility. When checked, they were found not to be breathing and efforts at resuscitation were futile. None of these cases involved the use of a TASER.

When we begin to examine similar fact patterns where the only added element is the use of the TASER the issue of causation becomes more complex. Of the four cases in B.C. where death is associated to the use of a TASER, the Coroner's Service has determined that cocaine use was a common factor. Gender is another common factor; all the restraint and TASER associated deaths in the Province during this time period involve males.

The same fact patterns noted in the Coroner's reports are mirrored in many of the estimated 50-125 in-custody deaths in the United States every year (Conner, 2002). This is an estimate as there are no official statistics available at this time. It should be noted, however, that since January 2003, federal legislation was passed in the United States requiring all law enforcement agencies to not only report, but also categorize all in-custody deaths. It is hoped that the Bureau of

Justice Statistics will have a statistical report available, specific to this topic area, in the Fall of 2005. In Canada, we face a similar issue in that there is no central national repository that collects statistics on sudden and unexpected death proximal to restraint attributed to Excited Delirium. Although most provincial coroners do keep statistics on sudden deaths attributed to law enforcement, most do not break down these deaths into specific categories and as such lump all deaths, including shootings and suicides while in police custody, into one category. Very recently, however, some provinces such as Ontario are now beginning to capture this data.

Incidents of sudden and unexpected deaths proximal to restraint first came to the attention of law enforcement in the early 1980's, due to the increased amount of data relating to deaths associated with police use of force, especially where a suspect was placed into a maximal prone restraint (commonly referred to as a "hog-tie"). Although the terms "hog-tie" and "hobble" are often used interchangeably it is important to differentiate between the two. The maximal prone restraint method (hog-tie), involves securing both wrists and ankles together behind the back, while the "hobble" is the tactic of securing the ankles together (without connecting them to the wrists), to inhibit the subject from placing the soles of their feet in contact with the ground.

It should also be noted that deaths similar in nature to those occurring in law enforcement contexts are also being experienced in psychiatric and geriatric care facilities where patients/residents are required to be restrained for their safety and security (Paterson et al., 2003). Since 1995, there have been 20 reported deaths in U.S. medical facilities as a result of physical restraint being used by medical staff personnel (*Joint Commission for Accreditation of Health Care Organizations, 1998*).

In 1988, Dr. Reay, a King County medical examiner in Washington State, began to hypothesize that sudden and unexpected deaths proximal to restraint appeared to be associated with something that he and others termed "Positional Asphyxiation". Positional Asphyxiation was associated with a suspect being hog-tied after being physically restrained, hands and feet secured behind the back and the suspect placed in the face down prone position (Maximal Prone Restraint). Dr. Reay in his research, found that such a restraint, associated with the prone position, was responsible for sudden and unexpected deaths proximal to restraint due to asphyxia (Reay, Flinger, Stillwell, & Arnold, 1992).

Due to Dr. Reay's research, many law enforcement agencies around the world began to prohibit the use of the hog-tie restraint and provided training to their members on the issues surrounding "Positional Asphyxia", in an attempt to combat the incidence of sudden and unexpected deaths proximal to restraint. Although Dr. Reay's research was ground breaking, subjects were still dying in police custody in the United States and Canada, even though they were not placed in a face down hog-tied position.

In 1998, as a result of a civil suit filed against the County of San Diego, Dr. T. C. Chan, Dr. G. M. Vilke and Dr. Tom Neuman, physicians from the Department of Emergency Medicine, University of California San Diego Medical Center were asked to replicate the Reay study (Chan, Vilke, Neuman, & Clausen, 1997). Their study contradicted Reay's findings and the results of their research were presented at trial. Faced with these findings, Dr. Reay agreed that his original research may have been faulty. The court found the following:

> *After Dr. Reay's retraction, little evidence is left that suggests that the hog-tie restraint can cause asphyxia. All of the scientists who have sanctioned the concept of positional asphyxia have relied to some degree on Dr. Reay's work. The UCSD study has proven Dr. Reay's work to be faulty, which impugns the scientific articles that followed it. Like a house of cards, the evidence for positional asphyxia has fallen completely (Ann Price et al., Plaintiffs, v. County of San Diego et al., Defendants*, 1998).

In support of Chan's research, a 1998 study looked at 61 cases of sudden and unexpected death proximal to restraint (Ross, 1998). Dr. Ross found that only 38% of all subjects who had died had been placed in the face down hog-tied position and because of this fact, reported that Excited Delirium was more directly related to the sudden deaths than the restraint position.

A further 1999 research study that looked at the effects of positional restraint on heart rate and oxygen levels (Schmidt & Snowden, 1999) found that healthy persons, even after physical exertion, are at little risk when held in the hog-tie position and placed onto their side.

Despite these findings, doctors, and coroners continued to cite "positional asphyxia" as a cause of death in restraint-related cases and police departments continued to train their officers in the dangers associated to it.

In 1998, the Ontario Coroner's Office published a retrospective study of 21 cases of unexpected death in people with Excited Delirium that occurred between 1988 and 1995 within the province

of Ontario (Pollanen, A., Cairns, & Young, 1998). Of the cases reported, 18 deaths occurred while the subject was in police custody. In all 21 cases, Dr. Pollanen found that "many deaths related to Excited Delirium are associated with restraint in the prone position" (p. 1607) and that all of the subjects who died had lapsed into "tranquility" shortly after being restrained. Other findings in Dr. Pollanen's medical research included:

- 12 subjects (57%)experienced Excited Delirium caused by a psychiatric disorder ;
- 8 subjects (38%)experienced cocaine induced psychosis;
- 18 of the deaths (86%) happened while in police custody and could not be resuscitated;
- 8 of the 18 (44%) people restrained in the prone position also suffered chest compression from the body weight of 1 to 5 people who were restraining them;
- 4 (19%), had been pepper sprayed;
- 4 (19%) had heart disease at the time of death;
- 2 (10%) of the deaths happened in hospital after being in coma for several days;
- 6 people with cocaine Excited Delirium had cocaine levels similar to recreational users and lower than those who actually died from cocaine intoxication;
- Levels of cocaine associated with recreational use may be sufficient to cause Excited Delirium; and
- Of the deaths, none were TASER related.

Another study, involving the examination of the sudden and unexpected deaths of 21 males, occurring between 1992 and 1996 (O'Halloran & Frank, 2000) reported:

- One death associated with Taser use, the rest with other force options;
- Best estimates for the time held in a prone position was 2-12 minutes;
- 8 had a history of mental illness excluding substance abuse;
- 8 had a history of substance abuse;
- 17 appeared to be "acutely delirious";
- 11 had stimulant drugs in their system;
- 6 could be considered obese while 6 were normal weight;
- At postmortem, temperature was only taken in 3 cases with one reported to be hyperthermic (the relevance of hyperthermia will be discussed later in this report);and
- 6 were noted to be sweaty prior to death

This was the first report that mentioned the correlation between dopamine levels specific to cocaine use and the levels found in those suffering from bi-polar disorders and schizophrenia.

A third research project related to the sudden and unexpected death of subjects requiring restraint for Excited Delirium between 1992 and 1998 in the Los Angeles area (Stratton, Rogers, Brickett, & Gruzinski, 2001) identified the following factors:

- Examined 18 deaths resulting from 216 arrests made of subjects requiring restraint for Excited Delirium;
- 198 Excited Delirium subjects who were physically arrested and hobbled **DID NOT** die;
- Associated with the 18 deaths was a struggle by the victim which resulted in forced restraint;
- 78% had stimulant drugs in their system;
- 56% had chronic disease;
- 56% were classified as obese;
- All cardiopulmonary arrests were unanticipated and proceeded by a short period (estimates 5 minutes or less) during which the victim ceased struggling against restraints and developed a labored or shallow breathing pattern;
- Of the 18 incidents, 5 were TASER related;
- Of the remaining 13 deaths, other force option, excluding firearms, were used; and
- Report mentioned "severe metabolic acidosis" specific to Excited Delirium although the presence of metabolic acidosis was not determined in this study.

The medical community now began to focus on research surrounding the biological and physiological effects of a new medical phenomena that they termed "Excited Delirium" specific to sudden and unexpected death proximal to restraint.

Although identified as a new medical phenomenon in law enforcement, as mentioned earlier, problems similar to Excited Delirium have been reported in the medical literature since the mid 19th century (Bell, 1849). In 1849, Dr. Luther Bell, physician and Superintendent of the McLean Asylum for the Insane in Somerville Ma. was the first medical professional to describe Excited Delirium, stating, "*Victims of this organic mental disorder may be apathetic or depressed, or excited with fear or rage accompanied by sympathetic nervous system arousal.*" Dr. Bell had spent more than twelve years treating those admitted to his hospital. From 1836 to 1848 Dr. Bell admitted over 1700 patients and among those, 40 cases manifested a "peculiar" form of delirium. At least three-quarters of these cases, according to Dr. Bell, terminated fatally, with the remainder recovering fully.

A further report from the UK (Paterson et al., 2003) outlined the following information specific to death proximal to restraint in medical institutions:

- In mental health, before effective treatment for the acute phase of mania or psychosis was available, death as a consequence of exhaustion in patients was not uncommon;
- In a South Carolina hospital from 1915-1937, there were 360 deaths in which the cause was listed to be, "Exhaustion due to mental excitement";
- In 1946, Dr. Shulack appears to be the first medical professional to describe this phenomenon as "sudden exhaustive death in excited manics"; and
- In a 1952 study by Bellak et al, they describe the onset and symptoms of this syndrome as including:
    - Sustained motor and mental excitement with continued activity for a period of time;
    - Rapid, thready, pulse;
    - Profuse clammy perspiration;
    - Fall in blood pressure;
    - Hyperthermia;
    - Delirium and death

The literature review conducted to date confirms that Excited Delirium death, associated proximal to restraint, is not just a phenomena experienced by law enforcement, but also in psychiatric and geriatric care facilities (Joint Commission for Accreditation of Healthcare Organizations, 1998). In this published report, researchers found a total of 20 deaths associated with physical restraint in hospitals, psychiatric care facilities, as well as geriatric care facilities in the United States. A further report found in the Cormorant (Weis, 1988) reported about 145 deaths in chronic care facilities. As well, in a report authored by The Office Of The Ombudsman For Mental Health and Mental Retardation in Minnesota (Office of the Ombudsman for Mental Health & Mental Retardation, 2004), they located 142 "reported" restraint associated deaths in mental health facilities between 1988 and 1999.

The reasons for sudden and unexpected Excited Delirium deaths proximal to restraint are very complex and multi-factoral and as such, new research is coming to light every few months. Here in Canada, Chris Lawrence (Ontario Police College) working with other medical experts such as Wanda Mohr (Associate Professor, Psychiatric Mental Health Nursing, University of Medicine and Dentistry New Jersey) has been conducting groundbreaking research into the medical literature associated with Excited Delirium. These authors have also developed an

investigator protocol for police relating to the types of death associated to Excited Delirium (Lawrence & Mohr, 2004).

According to the medical literature reviewed for this report, there appears to be three specific groups of people who are most prone to sudden and unexpected death proximal to restraint attributed to Excited Delirium:

1. Those who are suffering from psychiatric illness, specifically bi-polar disorders and schizophrenia. This is also noted in a study where both agitated and non-agitated subjects suffering from schizophrenia died suddenly and unexpectedly (Rosh, Sampson, & Hirsch, 2003);
2. Those who are chronic illicit stimulant users;
3. Individuals who combine the two previous risk factors.

The common behaviours related to Excited Delirium include:

- Unbelievable strength and endurance;
- Imperviousness to pain;
- Ability to offer effective resistance against multiple officers;
- Hyperthermia;
- Perspiration, victims are often described as drenched in sweat;
- Bizarre and violent behaviour;
- Aggression;
- Hyperactivity;
- Extreme paranoia; and
- Incoherent shouting

When police officers are dealing with those experiencing Excited Delirium, manias specific to psychiatric illness and drug induced psychosis often present outwardly in the same manner. Practically speaking, it is almost impossible to accurately determine causation during an encounter.

As stated earlier, the causes of Excited Delirium are multi-factoral. In the literature, current medical research indicates some of the following medical concerns may play a contributory role in sudden and unexpected deaths proximal to restraint:

Cocaine Toxicity and the Dopaminergic Effect

It is widely accepted in the medical community that both illicit drugs, especially cocaine, as well as some anti-psychotic drugs, may cause the heart to be much more susceptible to an arrhythmia (Straus, Bleumink, Dieleman, 2004). Long term use of cocaine markedly increases norepinephrine levels with the possibility that such users may be primed for a malignant arrhythmia (Barkley Burnett & Adler, 2004). Other conditions that provide such an anatomic substrate include Wolfe-Parkinson-White syndrome and left ventricular enlargement. Even low levels of cocaine in a person's system can cause tachydysrhythmias. (Barkley Burnett & Adler, 2004)

Cocaine Toxicity to the Brain

In the hypothalamus, chronic cocaine use causes issues in the brain preventing it from clearing dopamine from the synapses resulting in delirium (Barkley Burnett & Adler, 2004) .

Due to the fact that dopamine also plays a role in the regulation of core body temperature, increased dopaminergic neurotransmission "may" contribute to psychostimulant-induced hyperthermia. It is hypothesized that hyperthermia "may" result from extensive muscular activity in the setting of warm ambient temperature and perhaps, humidity (summer months or even hot rooms with poor ventilation) in combination with aberrant thermoregulation in the hypothalamus and mesolimbic system. Chronic cocaine use only multiplies this hyperthermic reaction to very dangerous levels. (Barkley Burnett & Adler, 2004)

The above noted is also supported by the National Association Of medical Examiners (Stephens, Jentzen, Karch, Wetli, & Mash, 2004). In their studies they found that chronic drug use is necessary to induce the changes in the neurochemistry that lead to Excited Delirium. They also posited that the presence of hyperthermia (core body temperature in excess of 103 degree F) is strongly supportive of cocaine induced Excited Delirium. This paper also examined the potential role anti-depressant medication may play:

"Acatecholamine – mediated Excited Delirium, similar to cocaine, is becoming increasingly recognized and had been detected in patients with mental disorders taking anti-depressant medications. In psychotic patients who have stopped taking their anti-depressant medications the neurochemistry is similar to the effects of cocaine."

Another reported factor potentially relevant to Excited Delirium may be when a subject suddenly ceases taking prescribed anti-depressant or anti-psychotic medication with the knowledge of their physician. This sudden absence of the prescribed medication (non-concordance) may cause the subject's mental condition to deteriorate to a point where psychosis results.

Cocaine Associated Rhabdomyolysis (CAR)

Rhabdomyolysis can be caused by severe over-exertion of muscle tissue (such as continued struggle against restraint once in custody) and can also be caused by many drugs of abuse including alcohol, as well as certain types of prescribed medications. (A.J. Ruttenber et al, 1997, A.J. Ruttenber, McNally & Wetli, 1999). According to some of the medical literature reviewed, once rhabdomyolysis begins, muscle cells break down and allow the contents of the cells to leach into the blood stream making the heart more susceptible to arrhythmia due to alterations in the potassium and sodium levels of the blood.

It is hypothesized (Barkley Burnett & Adler, 2004) that long-term cocaine use, rather than short-term use, is responsible for persistent changes in dopaminergic function that places users at risk for both Excited Delirium and CAR. Elevations in muscle enzymes levels are observed in asymptomatic chronic cocaine users and in untreated persons with schizophrenia; this evidence lends support to the hypothesis that chronic alterations in dopaminergic function can affect skeletal muscle physiology.

Metabolic Acidosis

In 1999, Hick et al raised awareness of the relationship between Metabolic Acidosis and its effects possibly contributing to sudden death during restraint (Hicks, Smith & Lynch, 1999). Hick's study found that there might be exacerbation of exercise induced lactic acidosis by vasoconstriction, which could be enhanced by cocaine and other CNS stimulants. Due to the fact that the literature reports that Excited Delirium appears to render victims impervious to pain, it may permit levels of physical exertion far beyond normal physiological limits and thus result in a severe acidosis. In discussions with Dr. Christine Hall, Program Director, FRCP Program in Emergency Medicine, during a seminar on Excited Delirium hosted by the Calgary Police Dept., she hypothesized that hypoventilation may be contributing to a fatal shift in blood pH. In her hypothesis, individuals suffering from Excited Delirium who are restrained in a prone position may be unable to breathe rapidly enough to exchange carbon dioxide. Although these individuals

have a clear airway and can speak, the restraint prevents them from breathing at the rate necessary and the excess carbon dioxide contributes to an academic state.

Catecholamine Release

During violent activity there is an abundant release of catecholamines into the blood stream that, according to the literature reviewed, can sensitize the heart and promote rhythm disturbances. It is also reported in the literature that catecholamines enhance the toxicity of cocaine, which can lead to seizures, respiratory arrest, and cardiac arrest. (Mets, Jamdar, and Landry, 1996)

In a research paper which looked at post exercise sudden deaths, (Dimsda, Hartley, Guiney, Ruskin and Greenblatt, 1984), specific to Catecholamine release, reported the following:

> *"These biochemical abnormalities, although present only transiently during the post exercise period may contribute to the vulnerability of the metabolically stressed myocardium to other arrhythmogenic factors, such as coronary insufficiency or ischemia. One well-documented effect of a reduction in plasma potassium concentrations that may affect cardiac vulnerability to arrhythmias is the increase in vascular resistance caused by reductions in potassium, especially in the presence of high levels of catecholamines. If the coronary arteries constrict in response to the sharp fall in potassium after exercise, the risk of arrhythmia would be elevated in subjects whose coronary perfusion already was limited by pre-existing disease."*

Genetic Susceptibility to Arrhythmia

Very recently, several studies (Priori and Napolitano, 2004), (Lehnart, Xander, Laitinen, Reiken, Deng, Cheng, LanDr.y, Kontula, Swan, and Marks, 2004), and (Vos and Paulussen, 2004) have reported that the identification of the molecular determinants of inherited arrhythmogenic disease has been pivotal to the understanding of several aspects of cardiac arrhythmias and sudden death. These researchers have found that there is a wide spectrum of clinical phenotypes caused by abnormal genes encoding for transmembrane cardiac ion channels that can cause sudden death. Here in Victoria during the coroner's inquest into the death of Anthany Dawson, a medical geneticist, Dr. Patrick McLeod, found a rare gene in a specific First Nations family that made family members more susceptible to the negative effects of Excited Delirium.

Face Down Prone Restraint Proximal To Arrest

It is interesting to note from an investigative standpoint, that in the majority, but not all, of sudden and unexpected deaths proximal to restraint involving a subject experiencing Excited Delirium, most subjects had been restrained and left in a face down prone position. Even though Dr. Reay's research specific to positional asphyxia has been put into question by Chan, Ross, and Snowden's independent research, there still appears to be some medical or physiological issues with leaving a subject who is experiencing Excited Delirium in a face down prone position where the subject has been "hog-tied" and/or weight is continually applied onto the upper torso. This may well relate to Dr. Hall's hypothesis with respect to hypoventilation. Although there appears to be an empirical correlation between Excited Delirium, physical restraint and sudden and unexpected death, the exact causal mechanisms are still medically unknown. Therefore, the inference that a particular physical restraint position is an independent predictor of death during physical restraint cannot be definitively confirmed without further research (Day, 2002).

Throughout the medical literature reviewed, the one thing that all of the medical community can agree upon is that Excited Delirium is a "medical emergency" no matter what the cause (Barkley Burnett & Adler, 2004; Farnham & Kennedy, 1997; Lawrence & Cairns, 2001; Young, 1995).

Good practice guidance, specific to the use of force, suggests that restraint should be subject to risk assessment, weighing the totality of the circumstances (Paterson et al., 2003). There are going to be times in policing, as well as in health care, where non-physical approaches to control will not be practicable or reasonable and physical restraint may represent the only intervention capable of protecting the subject or others from death or serious bodily injury.

INTERIM RECOMMENDATIONS

These interim recommendations are made after reviewing general police use of TASER's in the Province of British Columbia and DO NOT relate to the primary investigation involving Robert Bagnell's death or the Vancouver Police Department.

Based on our research to date, this Investigative Team is of the opinion that the TASER should be retained as an Intermediate Weapon for use by police in British Columbia, subject to any recommendations that may emerge from our Final Report. Our analysis of the field usages and the medical literature suggests appropriate use of the TASER presents an acceptable level of risk to subjects being controlled.

At the same time, we believe that more can be done to ensure uniformity of training across the Province, to provide enhanced levels of accountability, and to decrease the risk to those groups most at risk from sudden and unexpected death associated to restraint, whether or not the TASER is used.

RECOMMENDATIONS

Standardized Training:

There appears to be significant inconsistencies throughout the province in the training of police officers in the use of the TASER.

Therefore, we are recommending the creation of a standardized Lesson Plan/Course Training Standard for TASER users in British Columbia. This Course Training Standard would be developed by the Justice Institute of British Columbia in consultation with Use of Force coordinators representing all municipal police agencies and the RCMP. This "core curriculum" would be delivered to all recruits and all in-service TASER users. Agencies would be free to provide training beyond the Course Training Standard, once that initial training had been received.

Mandatory Reporting:

Not all agencies in the province currently require officers to properly report TASER deployment. Some agencies with mandatory reporting policy may not be capturing all usages due to insufficient levels of supervision.

Therefore, we are recommending that after any deployment of a TASER (probes or push-stun application) the user must submit a Use of Force report that captures relevant information and that will allow for statistical analysis of TASER use across the Province. Ideally, this Use of Force report would be delivered via PRIME BC, in a format created by the Justice Institute of British Columbia, in consultation with Use of Force coordinators.

Acquisition of New Taser Technology:

If agencies wish to acquire new TASER technology, we are recommending the X26 TASER due to its enhanced date collection capabilities and lower electrical output.

Although there is no evidence to suggest that the output of the M26 TASER exceeds acceptable levels, the X26 provides a greater margin of safety as documented in the Alfred studies.

Excited Delirium Training:

The phenomena of Excited Delirium still appears to be under recognized in the policing community. Although relatively rare, changes in patterns of drug abuse make it likely officers will encounter victims of Excited Delirium more frequently.

Therefore, we are recommending the creation of a standardized Lesson Plan/Course Training Standard for Excited Delirium by the Justice Institute of British Columbia. This training is to be delivered to all recruits as well as all in-service members, regardless of rank, in the Province.

Restraint Protocols:

Although medical evidence remains inconclusive, there does appear to be a linkage between restraint positions and enhanced risk to arrested subjects.

Until definitive research has been conducted, we are recommending that that the use of the maximal restraint position, where handcuffs and ankles are bound behind the back, should be eliminated by police agencies in the Province. A Hobble restraint, a Wrap restraint or other similar devices should be provided to police along with appropriate training. Hobble restraints are inexpensive and training costs should be minimal.

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